REMARKS

In the last Office Action, claims 1-3 and 7-9 were provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/410,600. Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP 9-101960 to Norimatsu and US 2005/0068052 to Patterson et al. ("Patterson"), claims 7-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Patterson, and claim 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Patterson in view of JP 6-082507 to Uehara. Claims 1-3 were objected to as containing informalities, and appropriate correction was required.

The Examiner acknowledged applicant's claim for foreign priority under 35 U.S.C. §119 and receipt of the priority document, thereby perfecting the foreign priority claim. The Examiner also indicated that the drawings are acceptable.

In accordance with this response, claims 1-3 and 9 have been amended, claims 7-8 have been canceled and new claims 10-27 have been added. The specification has been revised in editorial respects to correct informalities and improve the wording.

The present invention relates to a method of inspecting a sample using a microscope to observe and analyze

the change in contrast between the state in which a sample surface is irradiated with an electron beam or a positively charged ion beam and the state in which a target area of the highly charged sample surface is irradiated with an oppositely charged ion beam or an electron beam. By observing the change in contrast caused by irradiating the sample surface with oppositely charged ion beams, the sample can be inspected for wiring continuities, defects and the like.

By way of example, Fig. 2 shows irradiating a sample surface with an electron beam for charging and observing the sample surface, and then irradiating the charged sample surface with a positively charged ion beam to cause a change in contrast of the irradiated area while the sample surface is observed using the electron beam. As described in the specification, the present invention eliminates the troublesome need for contacting the charged sample surface with a probe in order to obtain a change in contrast, and thus the inventive method is much easier and quicker to use.

Independent claim 1 recites a semiconductor inspection method comprising microscopically observing and analyzing both the state of a sample surface which is irradiated by an electron beam or a positively charged ion beam to charge the sample surface, and the change in contrast of an area of the sample surface in a highly charged state

when the area is irradiated with an oppositely charged ion beam or an electron beam.

Independent claim 9 relates to a semiconductor inspection method comprising a first step of irradiating a predetermined area of a sample surface of a semiconductor device on which a wiring pattern is formed with a first charged particle beam to charge the predetermined area; and a second step of irradiating a second charged particle beam charged oppositely to the first charged particles, on a highly charged pattern of the charged predetermined area, wherein the change in the contrast on the sample surface after the second step from the time of the first step is observed by a microscope using the first charged particle beam.

Independent claim 14 recites a semiconductor inspection method using a composite apparatus including both a first charged particle beam apparatus for scanning a first charged particle beam and a second charged particle beam apparatus for scanning a second charged particle beam, the second charged particle beam being oppositely charged to the first charged particle beam, comprising a first step for charging a sample surface by irradiating the first charged particle beam on the sample surface, a second step for observing an area in a highly charged state of the charged sample surface with the first charged particle beam apparatus, a third step for irradiating the second charged particle beam

on a selected target area of the area in a highly charged state of the charged sample surface, and a fourth step for observing a contrast change of the target area while the target area is being irradiated in the third step.

Independent claim 21 relates to a method of inspecting a sample using a composite apparatus having a vacuum chamber, a first charged particle beam apparatus for scanning a first charged particle beam in the vacuum chamber, and a second charged particle beam apparatus for scanning a second charged particle beam in the vacuum chamber, the second charged particle beam being charged oppositely to the first charged particle beam, the method comprising the steps of placing a sample to be inspected in the vacuum chamber, irradiating the sample, in the vacuum chamber, with the first charged particle beam to charge the sample surface, observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image, irradiating the target area of the charged sample surface, in the vacuum chamber, with the second charged particle beam to cause the target area to undergo a change in voltage contrast, and observing an image of the target area of the sample surface using the first charged particle beam apparatus to observe the voltage contrast change while the target area is being irradiated with the second charged particle beam.

No similar method is disclosed or suggested in the prior art.

Norimatsu discloses a method of detecting a wiring defect by irradiating a wiring 2 with an electron beam to negatively charge the wiring, applying a positive voltage to a terminal 3 of the wiring, and observing a potential contrast image of the wiring 2. Norimatsu requires means for connecting the external terminal 3 to an external voltage source, and the Norimatsu method cannot apply a voltage to an isolated pattern on the wiring surface in a simple manner, such as done in the present invention by irradiating a target portion of the charged sample surface with an oppositely charged particle beam.

Patterson discloses a voltage contrast-based method for detection of electrical continuity, in which two charged particle beams, one a low-energy beam and the other a high-energy beam, are irradiated on two separate conducting components on a sample, and the voltage contrast images are observed to determine whether there is continuity between the two conducting components. Stated otherwise, Patterson discloses irradiating two separate spaced-apart conducting components with different charged particle beams, and this requires the initial positioning of the components using a visual microscope and confirmation of position changes using a laser interferometer ([0033]).

Neither Norimatsu nor Patterson discloses irradiating a sample surface with a first charged particle beam to charge the sample surface, and irradiating a target area of the charged sample surface with an oppositely charged particle beam to create a contrast change, as required by the claims. The combined teachings of the references do not disclose or suggest the claimed method and would not have led one of ordinary skill in the art to modify either reference to arrive at the claimed method.

Applicant also respectfully traverses the non-statutory obviousness-type double patenting rejection of claims 1-3 and 9 as being unpatentable over claim 1 of co-pending Application No. 11/410,600 ("the '600 Application"). For purposes of the double patenting rejection, the Examiner compared claim 1 of the '600 application with claim 9 of the present application. As amended, claim 9 of the present application includes the step of irradiating a predetermined area of a sample surface of a semiconductor device on which a wiring pattern is formed, and a second step of irradiating a second charged particle beam charged oppositely to the first charged particles, on a highly charged pattern of the charged predetermined area. On the other hand, claim 1 of the '600 application does not include the limitation that the sample is a semiconductor device on which a wiring pattern is formed, and does not include the

limitation of irradiating the second charged particle beam on a highly charged pattern of the charged predetermined area that was irradiated with the first charged particle beam. The differences between the two claims are not obvious variants of one another and, therefore, claim 1 of the '600 application does not render obvious claim 9 or any of the other claims in the present application.

In view of the foregoing, the application is now believed to be in allowable form. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Applicant

By: _____
Bruce L. Adams
Reg. No. 25,386

17 Battery Place
Suite 1231
New York, NY 10004
(212) 809-3700

MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Mail Stop Amendment, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

Patricia Petrocelli
Name

Patricia Petrocelli
Signature

JANUARY 12, 2009
Date